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PINE BEETLE SURVEY OF 1946 on the MALHEUR NATIONAL FOREST

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Surveys to determine the extent and severity of western pine beetle infestations in the ponderosa pine stands within and adjacent to the Malheur National Forest have been conducted annually since 1931. These surveys have been carried on through the cooperative efforts of the Forest Service and the Bureau of Entomology and Plant Quarantine. The survey of 1946, the sixteenth in this series, was again conducted on this cooperative basis.

In 1946, for the first time since 1942, a general reconnaissance of insect conditions in all forest types on the forest was made to supplement the plot work. The intensive phase of the survey consisted of a 100 percent cruise of all insect-caused losses on nine semi-permanent 320-acre plots. These plots were cruised during the period August 17 to September 2 by a Forest Service crew consisting of Gould J. Hoyt, crew leader, Fred Reiter and Donald C. Wheat. The writer gave the crew technical supervision and carried on the extensive survey, which consisted of general observations made in the woods and from strategic points, such as roads, trails, and lookouts.

The 1946 survey completed the 1945 loss data on the plots and provided a partial record of the 1946 loss. Infestation trends were computed from these data and used, together with information obtained on the extensive reconnaissance, to estimate the 1945 losses occurring over the forest as a whole.

Conditions on the Plots

Drought conditions, such as enabled the western pine beetle to kill timber wholesale in 1931 and 1932, again occurred during 1943 and the early part of 1944. These conditions, being adverse to tree growth and favorable to bark beetle development, apparently stimulated the pine beetle to stage a sharp recovery from the all-time low point of infestation in 1943. Pine losses increased 47 percent during 1944, and the aggressive tendencies of the beetle population gave every indication that the infestation would soon become very serious. During 1945 climatic conditions became more favorable to tree growth. As a result the aggressiveness of the infestation diminished and only moderate increases occurred. Losses on the plots averaged 55 board feet per acre or .40 percent of stand. The ratio to the 1944 loss was 1.03.

Indications are that the infestation decreased to some extent during 1946. The detailed data secured on the plots are presented in Table 1.

General Forest Conditions

Insect-caused losses on most of the forest in 1945 and 1946 were low. However, in four localities pine beetle infestation of light epidemic proportions was present.

The largest center of pine beetle infestation was on the area drained by the East Fork of Beech Creek, roughly extending from Haddue Guard Station southeast to Grub Creek. Losses above normal have persisted in these badly depleted, high hazard stands throughout the period when losses over the remainder of the forest were at a low endemic stage. During 1945 and 1946 the losses on the East Fork of Beech Creek were the highest on the forest.

The second largest area of light epidemic infestation was on Canyon Creek. An above-normal infestation has long persisted in these stands and from all appearances it will eventually eliminate the mature ponderosa pine from the south and west slopes of the canyon. During 1944 the infestation in this center became aggressive and spread south over the divide into the selectively logged stands in Bear Valley. In that year losses on the residual stands of Bear Valley near the Canyon Creek Divide ranged up to 82 board feet per acre or .91 percent of the stands. During 1945 this infestation in the Canyon Creek drainage and vicinity remained more or less static. In 1946 it showed definite signs of declining. The decline was especially noticeable in the cut-over stands.

Active infestation has been in progress for a number of years in the stands of very high beetle hazard in the lower portions of the Murderer's Creek and Bear Creek drainages. Selective logging of these stands, completed in 1946 prior to the pine beetle survey, reduced the infestation considerably. However, an above-normal infestation continued in the residual stands. In a large measure this continued loss was probably due to the disturbance created by logging. The situation was aggravated by the considerable number of high risk trees that remained on certain areas. No doubt the original stand was so decadent that the timber markers had to leave many trees of poor vigor, or abandon the idea of selective cutting. From the beetle control standpoint it would have been much better had the high risk trees been removed, even if clear cutting had resulted on certain local areas. As matters are now, the high risk trees in the reserve stand are rapidly being converted into snags, and in the process they are endangering the more resistant trees.

A small center of pine beetle infestation is present in the Sawtooth Creek drainage and extends west to Emigrant Creek. This local outbreak, which has been present for several years, has not been aggressive. In 1946 it appeared to be declining to an endemic status.

For the entire forest the loss of ponderosa pine from bark beetle activity in both the virgin and selectively logged stands during 1945 is estimated to have been more than 24 million board feet, an average of some 27 board feet per acre. The breakdown of this loss is presented by areas and units in Table 2. In this connection it should be noted that, due to the large amount of cutover land in various degrees of stocking, it is not possible with present information to give reliable figures on the percent of stand killed.

Other Insects

In 1945 two insects were found to be defoliating ponderosa pine reproduction and poles on parts of the Malheur National Forest. One of these insects, a budworm tentatively reported last year as Eucosma bobana, has since been authoritatively determined by Mr. Carl Heinrich as Archips retiniana, a race of the spruce budworm. The other is a sawfly, an unidentified species of Neodiprion. Both of these insects continued to be active in 1946. On an area east of the Malheur River, near the headwaters of Cliff, Skookum, and Log Creeks, the budworm and the sawfly occurred together, in some cases on the same trees. They were also associated in an infestation of considerable intensity on the ridge north of Fox Valley. The heaviest defoliation occurred on some 10,000 acres around Antelope Mt. and was principally caused by the budworm.

Archips retiniana attacks the immature foliage in the upper portion of the crown of trees up to about 50 feet in height. The larvae enter the needle sheath and mine out the base of the partially developed needles. The severed needles soon turn yellow, then red, and finally they drop off the branches. The majority of the infested terminals and twigs cease to grow and many die back to the preceding year's growth (see Figure 1). Trees that were heavily attacked in 1944 and 1945 were severely deformed and stunted. On this basis it is considered probable that the much heavier and more extensive attacks of 1946 will have considerable lasting effect upon the infested trees.

The Neodiprion consumes the entire needle down to the sheath. The older foliage is preferred but, when defoliation is severe, the immature growth of the current season is also attacked. The outbreak, first recorded in 1945, continued to develop and spread during the spring of 1946. Then, about mid June, a deadly wilt disease appeared among the half-grown larvae. This disease rapidly reduced the sawfly infestation to an endemic status. No serious lasting effects of the sawfly defoliation are anticipated.

In 1946 the spruce budworm, Archips fumiferana (Clem.) was found to have attacked both white fir and Douglas-fir on the ridge extending west of Long Creek Mt. Mature trees were only lightly defoliated but in some canyons the young understory trees were completely stripped of their foliage.

During the past three years bark beetles have been rather active in the Douglas-fir and true fir stands of the forest. In Douglas-fir the Douglas-fir beetle seems to have been the primary species, whereas in white fir Scolytus ventralis has been the dominant species. Mature trees have been most heavily attacked. Over the forest as a whole the losses have been considerable and in some localities groups of 8 to 10 dead trees are fairly common. Apparently the outbreak peaked in 1945 and is now on the wane.

Other Phenomena

A needle-killing fungus, Elytroderma deformans (Darker), appeared on ponderosa pine on many parts of the forest early in 1946. This fungus is reported to be capable of killing reproduction and poles and seriously weakening mature trees. Over most of the forest the infection was comparatively light. The heaviest infection, though not serious, was found in the John Day Canyon near Call Creek. Considerable infection was also reported on Rail Creek.

During the winter and early spring of 1946 abnormally severe wind-throw and snow-break occurred on certain portions of the forest. Windthrow was especially evident on that portion of the forest east of the Malheur River, usually occurring as scattered trees. Heavy snow break occurred on the Sawtooth Area. While some mature trees were broken off, the majority of the damage occurred in immature stands. The survey crew found 49 snow-broken trees of merchantable size on the Sawtooth plot.

Recommendations

No western pine beetle infestation sufficiantly aggressive to warrant direct control was found on the forest during 1946.

Past epidemics and continuing heavy losses have badly depleted stands on the area east of Beech Creek and on Canyon Creek. The large percentage of high risk trees remaining in these stands indicates that a high mortality can be expected for some time to come. It is recommended that, where economically feasible, salvage operations be carried out on these areas to save the remaining values before they are destroyed by the beetles.

Table 1. Ponderosa pine killed by bark beetles on virgin check plots - Malheur National Forest and adjacent private lands

Area & Plot	Plot Description T	R	Sec.	Timber Acres	Pine Volume B. M.	1945 Loss No. Trees	Volume B. M.	Per Acre	% of Stand	Ratio to 1944
John Day										
Long Creek	10S	23E	24 S½	320	2,907,250	20	11,060	35	.38	2.18
Rudio Mtn.	11S	28E	26 W½	245	3,031,660	20	12,300	50	.41	4.30
Beech Cr.	12S	31E	25 N½	313	2,340,330	65	26,200	84	1.12	1.04
Area Total				878	8,279,240	105	49,560	57	.60	1.50
Snow Mtn.										
Sawtooth	19S	28E	15 E½	320	4,920,720	50	21,870	67	.44	1.25
Malheur River										
Bridge Creek	17S	32E	36 W½	320	4,650,050	24	14,120	44	.30	1.17
Williams Ranch	20S	32E	30 W½	320	4,725,770	31	16,020	50	.34	1.16
Mahogany Spr.	17S	33½E	28 E½	320	3,645,490	25	19,210	60	.53	1.04
Summit Cr.	17S	35E	29 E½	320	4,311,910	9	11,640	36	.27	.93
Crane Prairie	16S	35E	10 W½	320	8,270,490	26	21,910	68	.27	.52
Area Total				1,600	25,603,710	115	82,900	52	.32	.84
Forest Total				2,798	38,803,670	270	154,330	55	.40	1.03

Table 2. Estimate of insect caused ponderosa pine losses - Malheur National Forest

Area & Unit	Pine Type			Estimate of 1945 Loss			
	Virgin Acreage	Cutover Acreage	Total Acreage	No. of Trees	Volume M.B.M.	Trees per Section	B. M. Per Acre
John Day							
Long Creek	15,150	4,310	19,460	350	190	15	13
Rudio Mtn.	81,510	170	81,680	1,910	1,110	15	14
Hiyu	32,460	8,220	40,680	1,170	700	23	36
Beech Creek	85,520	3,160	88,680	6,010	3,610	45	42
Fields Peak	23,740	2,020	25,760	370	190	10	8
Canyon Creek	54,420	8,460	62,880	4,900	2,940	48	54
Strawberry Mtn.	36,240	5,620	41,860	850	420	15	12
Total	329,040	31,960	361,000	15,560	9,160	30	28
Silvies							
Flagtail	47,710	49,070	96,780	4,520	2,490	30	26
Bear Valley	0	78,520	78,520	2,660	1,520	20	19
Myrtle	62,880	51,820	114,700	3,230	2,020	18	18
Total	110,590	179,410	290,000	10,410	6,030	23	21
Snow Mtn.							
Sawtooth	52,090	910	53,000	3,260	1,790	40	34
Malheur River							
Lake Creek	31,510	0	31,510	640	460	13	15
Summit Creek	29,510	2,630	32,140	920	740	20	25
North Fork	65,620	8,260	73,880	2,580	2,060	25	32
Bridge Creek	21,680	22,670	44,350	1,730	1,220	25	27
Middlefork	41,590	3,350	44,940	2,460	1,600	38	38
Calamity	23,200	2,790	25,990	1,160	670	32	29
Crow Flat	34,430	26,760	61,190	1,930	960	36	28
Total	247,540	66,460	314,000	11,420	7,710	29	31
Forest Total	739,260	278,740	1,018,000	40,650	24,690	29	27

FIGURE 1.
Damage to terminals of ponderosa pine reproduction by *Archips retiniana* (Wlsm.)